

## CLAIMS

1. An underwater lighting unit comprising an array of light emitting diodes (LEDs) mounted against the back wall of a thermally conductive housing, a  
5 collimator comprising a conical or pyramidal moulding of a clear transparent material in front of each LED and a transparent screen aligned across front faces of the collimators and in contact with those front faces, the transparent screen being sealingly edge-mounted in a peripheral recess around the side wall or walls of the housing so as to create and maintain a sealed air space  
10 between the interior of the housing and the conical or pyramidal walls of the collimators, the side wall or walls and optionally part of the back wall of the housing being in direct heat exchange contact with the water in which the lighting unit is submerged in use so as to provide a proper degree of cooling for the LEDs.
- 15
2. An underwater lighting unit according to claim 1, wherein the back wall of the housing is in use in direct contact with a surface on which the lighting unit is mounted, so that the said surface acts as a heat sink to augment the cooling provided by the contact of the side wall or walls of the housing which  
20 are in contact with the water in which the lighting unit is submerged.
3. An underwater lighting unit according to claim 1 or claim 2, wherein the housing is cast, formed or machined from a single piece of metal so that the back and side walls are contiguous and joint-free.
- 25
4. An underwater lighting unit according to claim 3, wherein the housing is formed from stainless steel.
5. An underwater lighting unit according to claim 3, wherein the housing is  
30 formed from aluminium or aluminium alloy.

6. An underwater lighting unit according to claim 1 or claim 2, wherein the housing is injection-moulded from a highly thermally conductive plastic material so that the back and side walls are contiguous and joint-free.
- 5 7. An underwater lighting unit according to any preceding claim, wherein the transparent screen is a toughened glass screen.
8. An underwater lighting unit according to claim 7, wherein the screen is received in the peripheral recess around the side wall or walls of the housing  
10 so as to lie flush with the front edge of the side wall or walls, and is sealed and secured in place by a continuous bead of silicone resin placed around the recess before installation of the glass screen.
9. An underwater lighting unit according to any preceding claim, wherein  
15 the LEDs are mounted on one or more printed circuit boards.
10. An underwater lighting unit according to any preceding claim, wherein the or each printed circuit board is secured to the back wall of the housing by encapsulating the printed circuit board or boards in a thermosetting resin  
20 compound with only the LEDs exposed.
11. An underwater lighting unit according to claim 10, wherein each collimator is a solid acrylic cone or pyramid having a recess at its apex for receiving the associated LED.  
25
12. An underwater lighting unit according to any preceding claim, wherein electrical leads for supplying electrical power to the LEDs pass through at least one aperture in the back wall of the housing.
- 30 13. An underwater lighting unit according to claim 12, wherein the or each aperture leads to the interior of a hollow tubular mounting stem extending from the back wall of the housing, the mounting stem or stems being

- 20 -

externally screw-threaded for mounting the underwater lighting unit through a back wall of a cofferdam of a marine vessel or through the hull of the marine vessel.

- 5      14.      An underwater lighting unit according to claim 13, wherein the electrical leads pass through the mounting stem or stems and are sealed therein by having thermosetting resin injected into the hollow interior of the mounting stem or stems around the electrical leads.
- 10      15.      An underwater lighting unit according to claim 13 or claim 14 secured through the back wall of a cofferdam of a marine vessel or through the hull of a marine vessel, with a seal between the housing of the lighting unit and the back wall of the cofferdam or the hull comprising an initially flat elastomeric sealing disc being trapped between one or more rearwardly facing annular
- 15      ribs on the back wall of the housing and one or more forwardly facing annular ribs on the back wall of the cofferdam or on the hull, both ribs or sets of ribs being concentric with the mounting stem of the housing and being of increasing diameters so that the sealing disc is distorted into a corrugated shape as the housing and cofferdam or hull are drawn tightly together by a nut
- 20      screwed onto the mounting stem.
16.      An underwater lighting unit according to claim 15, wherein the seal between the housing of the lighting unit and the back wall of the cofferdam or the hull is further enhanced by the sealing disc being received in a circular
- 25      recess in the back wall of the housing, with the associated annular rib or ribs of the housing extending from the base of the circular recess.
17.      An underwater lighting unit according to any preceding claim, wherein the LEDs are each at least one watt in power.
- 30      18.      An underwater lighting unit according to any of claims 1 to 15, wherein the LEDs are each at least three watts in power.

19. An underwater lighting unit according to any preceding claim, wherein there are 30 or more LEDs in the array.